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INDUSTRIAL HYGIENE MANAGEMENT PRACTICES for WORKER PROTECTION PROGRAMS

INDUSTRIAL HYGIENE COORDINATING COMMITTEE

Section I. INTRODUCTION

The practice of industrial hygiene encompasses functions that should be an integral part of a program such as that defined in DOE 440.1, "Worker Protection Management for DOE Federal and Contractor Employees." The purpose of these Industrial Hygiene Management Practices for Worker Protection Programs is to facilitate the development, implementation, and maintenance of these industrial hygiene functions so as to achieve the order's policy objectives and fulfill its requirements.

Section II. GENERAL INFORMATION

A worker protection program well maintained in conformity with DOE 440.1 protects the occupational health of DOE and contractor employees and ensures the collection and maintenance of industrial hygiene data at government-owned or -leased facilities and operations.

A sound worker protection program encompasses the concept of prudent avoidance of worker exposure to any hazardous material. Prudent avoidance involves minimizing the number of individuals potentially at risk from exposure, minimizing individual worker's potential for exposure, and maintaining concentrations of all atomospheric contaminants as low as is practical.
DOE Order 440.1 requires that worker protection programs include:

1. Initial or baseline surveys of all work areas or operations to identify and evaluate potential worker health risks.
2. Coordination with planning and design personnel to anticipate and control health hazards that proposed facilities and operations would introduce.
3. Periodic resurveys and/or exposure monitoring as appropriate.
4. Documented exposure assessment for chemical, physical, and biological agents, and ergonomic stressors using recognized exposure assessment methodologies and accredited industrial hygiene laboratories.
5. Specification of appropriate engineering, administrative, work practice, and/or personal protective control methods to limit hazardous exposures to acceptable levels.
6. Worker education, training, and involvement.
7. Coordination with cognizant occupational medical, environmental, health physics, and work planning professionals.
8. Use of DOE-accepted respiratory protection when National Institute for Occupational Safety and Health (NIOSH) approved respiratory protection does not exist for DOE tasks.
9. Policy and procedures to mitigate the risk from identified and potential occupational carcinogens.
10. Use of appropriate industrial hygiene standards.
11. Professionally and technically qualified industrial hygienists to manage and implement the industrial hygiene aspects of the worker protection program.

Section III. INDUSTRIAL HYGIENE MANAGEMENT PRACTICES

1. INDUSTRIAL HYGIENE FUNCTIONS

1.1 Initial or baseline surveys of all work areas or operations to identify and evaluate potential worker health risks.

The worker protection program should include documented initial and periodic health hazard assessments of the workplace for the purpose of anticipating, recognizing, evaluating, and controlling occupational health hazards. Health hazard assessments must be conducted in accordance with Occupational Safety and Health Administration (OSHA) regulations and must satisfy the requirements of DOE Order 440.1 where incorporated by contract. Health hazard assessments should be conducted or directed by the senior industrial hygienist (the senior industrial hygienist does not have to be on site to direct these assessments) and include the hazard assessment methodology contained in section IV.3 of the Implementation Guide for DOE Order 440.1 and this document.

A comprehensive industrial hygiene survey should evaluate all areas. For operations identified as having potential occupational health hazards, surveys should include:

1.1.1 Assessment of the hazardous or potentially hazardous employee exposures. Exposure assessments should evaluate, by measurement or observation, chemical, physical, biological, and ergonomic hazards including those due to residuals from past operations and facilities.

1.1.2 Measurements and observations adequate to assess compliance with applicable exposure limits. This can include personal, area, wipe, and bulk sampling; biological monitoring; and ergonomic observation.

1.1.3 Personal monitoring for airborne contaminants meeting the specifications of paragraph 1.4 of this section using breathing zone samples that reflect the 8-hour time-weighted average exposures (TWA), TWA excursions, short-term exposures, or ceiling exposure of the employee, as appropriate.

1.1.4 Sampling and analysis using methods specified by OSHA or the National Institute for Occupational Safety and Health (NIOSH) or by other methods documented to be at least as accurate as the OSHA or NIOSH methods.

1.1.5 Interpretation of personal monitoring results by the senior industrial hygienist or staff industrial hygienist(s) in a manner that is consistent with the procedures included in the OSHA *Field Operations Manual, Field Inspection Reference Manual,* and *Technical Manual.*

1.2 Coordination with planning and design personnel to anticipate and control health hazards that proposed facilities and operations would introduce.

1.2.1 Industrial hygiene staff should participate in the planning and design of new processes; in new construction, demolition, modification, or remodeling of existing processes; in evaluations of the effectiveness of proposed environmental control equipment; and in the approval of procedures for its use.

1.2.2 Industrial hygiene evaluations should include input from organizations and disciplines impacting and impacted by potentially hazardous operations, such as occupational medicine, epidemiology, occupational safety, fire protection, radiation protection, environmental protection, maintenance, operations, and engineering.

1.3 Periodic resurveys and/or exposure monitoring as appropriate.

The frequency of health hazard assessments should be proportional to the risk presented by the hazard as determined by the senior industrial hygienist. Industrial areas (e.g., research and development facilities, general industry areas, craft shops) should be evaluated at least annually, and more often if potentially severe health hazards are present. New and changed operations should be evaluated when started. Frequently changing work sites (e.g., construction sites and hazardous waste sites) should be evaluated as often as necessary. Low-hazard areas (e.g., ordinary offices and non-hazardous facilities) should be evaluated at least every three years or in accordance with applicable regulatory requirements. Unoccupied buildings should be evaluated initially and thereafter as frequently as deemed necessary.

1.4 Documented exposure assessment for chemical, physical, and biological agents and ergonomic stressors using recognized exposure assessment methodologies and accredited industrial hygiene laboratories.

1.4.1 Develop and maintain written health hazard assessment and control records for potentially hazardous exposures identified in the health hazard assessments and all health hazard prevention and control measures. Each record should be signed by the evaluating industrial hygienist and reviewed by the senior industrial hygienist or his/her designee.

1.4.2 The health hazard assessment and control records should include the following operational, administrative, hazard, hazard control, and employee data:

(1) A description of the operation, including an inventory of health hazards (hazardous chemicals, harmful physical agents, etc.) and the results of the health hazard assessment;

(2) The monitoring records documenting hazardous exposures, which should include:

(a) Unique identifiers for each employee sampled or, where representative monitoring is performed, for all employees represented by the monitoring results;

(b) The location, date, duration, and number of samples taken;

(c) A description of the rationale used to determine which employees to include in the representative sampling group and, when monitoring is being performed for compliance purposes, the rationale used to select those individuals having the highest exposure;

(d) The results of exposure monitoring, including a description of the sampling and analytical methods employed, supporting data, assumptions, and interpretations of results; and

(e) A notation of any conditions that may have affected the sampling results.

(3) A description of the specific means that were used to achieve or maintain compliance with applicable DOE-prescribed industrial hygiene requirements;

(4) A description of any control technology in place or to be installed and documentation of its efficacy or justification for using controls other than engineering controls to achieve compliance, including documentation of the effectiveness of any respiratory or other personal protective equipment used; and

(5) A detailed schedule for, and regular progress reports on, the implementation of required health hazard prevention and control measures, as required by DOE-prescribed industrial hygiene requirements.

1.4.3 For those work operations initially identified as having the potential for hazardous exposure but subsequently determined in the hazard assessment not to pose a health hazard, management should include the following in the health hazard assessment and control records:

(a) A description of the operation and the results of the health hazard assessment, including an inventory of the health hazards (hazardous chemicals, harmful physical agents, etc.) present and

(b) Any exposure monitoring records, including unique identifiers for each employee sampled or, where representative sampling is performed, for all employees whose exposures are represented by the monitoring results.

1.4.4 The American Industrial Hygiene Association (AIHA) has established a laboratory accreditation program for specific hazardous substances. All personal samples should be analyzed by a laboratory accredited by the AIHA for the substance class of interest (metals, organics, etc.). Non-accredited laboratories should provide users copies of their quality assurance programs and results of their quality reviews.

1.4.5 Provide the results of personal monitoring samples to affected employees within 10 working days of receipt of the results or in a manner that is consistent with the requirements of Title 29 Code of Federal Regulations 1910 and other applicable occupational health standards.

1.5 Specification of appropriate engineering, administrative, work practice, and/or personal protective control methods to limit hazardous exposures to acceptable levels.

1.5.1 Prevention and control measures should be implemented whenever a hazardous or potentially hazardous exposure exists.

1.5.2 The senior industrial hygienist should recommend to facility management prevention and control measures required to reduce the hazardous exposures of employees.

1.5.3 Control measures should be prioritized and implemented in accordance with the following hierarchy of controls:

(1) Engineering controls:

(a) Change to a less hazardous process or substitute a less hazardous material.
(b) Isolate or enclose the process or operation to prevent worker exposure.
(c) Use ventilation controls or other engineering controls to prevent or reduce worker exposure.

(2) Work practice and administrative controls that limit worker exposures:
(a) Develop work practices and procedures (e.g., standard operating procedures, limited access) to reduce or eliminate hazardous exposures.
(b) Maintain administrative controls (e.g., performance of hazardous activities during periods when few employees are present).

(3) Personal protective equipment:
(a) Use personal protective equipment. However, compliance with applicable exposure limits can not be achieved with the use of respiratory protective equipment except:
-- During the time period necessary to install engineering controls, evaluate controls, or repair controls;
-- In work situations such as maintenance and repair activities and hazardous waste and emergency response operations in which engineering controls are not feasible;
-- In work situations in which engineering controls and supplemental work practice controls are not feasible to reduce exposures to or below applicable exposure limits; or
-- For escape.
(b) Use of respiratory protection is discussed in Section 1.8.

1.6 Worker education, training, and involvement.

1.6.1 A worker protection committee should be established at every site and contain the following provisions:
(1) At least one member of the worker protection committee should be the senior industrial hygienist or a staff industrial hygienist;
(2) Industrial hygiene members of the worker protection committee should have access to health hazard assessment and control records, except for records containing personal identifiers; and
(3) Committee members should disseminate health hazard prevention and control information to the individuals they represent.

1.6.2 Management should ensure that line managers are trained in:
(1) Their responsibilities for implementing DOE-prescribed industrial hygiene requirements, including ensuring, through tracking and disciplinary procedures, that employees follow requirements, procedures, and methods for avoiding or controlling exposures to occupational health hazards;
(2) Recognition of the occupational health hazards associated with the jobs assigned to employees working under their supervision, the potential

effects of those hazards on employee health, and the methods appropriate and required to control employee exposure; and

(3) The industrial hygiene functions of the worker protection program.

1.6.3 Employees should be trained in:

(1) Methods and observations that may be used to detect the presence of an occupational health hazard in the work area (such as monitoring conducted by the contractor, continuous use of monitoring devices, visual appearance or odor of hazardous chemicals when being released, etc.);

(2) An understanding of the physical and health hazards of the hazardous chemicals, harmful physical agents, ergonomic stressors, and harmful biological agents in the work area;

(3) The measures employees can take to protect themselves from these hazards, including specific procedures such as appropriate work practices, emergency procedures, and personal protective equipment, implemented to protect employees from exposure to hazardous chemicals, harmful physical agents, ergonomic stressors, and harmful biological agents;

(4) The details of the hazard communication program developed by DOE or the contractor, including an explanation of the labeling system and the material safety data sheet, and how employees can obtain and use the appropriate hazard information; and

(5) The details of hazard-specific training programs mandated by DOE-prescribed industrial hygiene requirements.

1.7 Coordination with cognizant occupational medical, environmental, health physics, and work planning professionals.

1.7.1 Coordination is established, maintained, and documented between the industrial hygienists and other organizations' personnel in the facility to ensure successful implementation of the Worker Protection Program. These organizations include but are not limited to: occupational medicine, epidemiology, occupational safety, environmental protection, fire protection, radiation protection, purchasing, maintenance, engineering, operations, and contracting.

1.7.2 The senior industrial hygienist recommends employees to be included in medical surveillance and participates in the review of occupational exposure and medical surveillance data.

1.8 Use of DOE-accepted respiratory protection when National Institute of Occupational Safety and Health (NIOSH) approved respiratory protection does not exist for DOE tasks.

Where necessary, use NIOSH-approved respirators. When NIOSH-approved respirators do not exist for specific DOE tasks, respiratory protection tested and accepted for specific applications by the Los Alamos National Laboratory Respirator Studies Program may be used.

1.9 Policy and procedures to mitigate the risk from identified and potential occupational carcinogens.

1.9.1 The chemical substances covered by this program should be those regulated as carcinogens by OSHA under Title 29 Code of Federal Regulations 1910, Subpart Z, and those substances that meet the definition of "occupational carcinogen" contained in the DOE glossary. The program should apply to operations where the industrial hygiene staff has determined that use of a carcinogen creates a significant potential for occupational exposure. For carcinogens with prescribed exposure limits, the program should apply to operations where the industrial hygiene staff determines that controls are necessary to maintain occupational exposure below limits.

1.9.2 A program should be implemented to maintain occupational exposure to chemical carcinogens consistent with the current American Conference of Governmental Industrial Hygienists (ACGIH) *Threshold Limit Values for Chemical Substances and Physical Agents and Biological Exposure Indices.* For OSHA-regulated carcinogens, a program should be implemented that, at a minimum, conforms to the requirements of applicable OSHA standards. Exposure to other occupational carcinogens should be controlled by application of the industrial hygiene functions of identification, evaluation, control, periodic review, employee education, and medical monitoring. In addition, the following items should apply to the use of and/or potential exposure to carcinogens.

(1) Safety plans, standard operating procedures, or experimental protocols should be written describing the use of chemical carcinogens and the procedures used to control exposure. These documents should be reviewed and approved by the industrial hygiene staff prior to the initiation of an operation.

(2) Regulated areas should be established where chemical carcinogens are used. The characteristics of regulated areas should be appropriate to ensure that access is controlled and will depend on the quantity and physical properties of the material being used and on the operations being performed. A record should be maintained of all personnel working in regulated areas.

(3) Engineering controls should be the primary method used to minimize exposure to carcinogens and to prevent the release of carcinogens into the workroom environment. Provisions should be made to ensure that hazardous levels of contaminated air are not released into adjacent work areas or the outside environment. All contaminated liquid and solid waste should be disposed of using approved methods.

(4) Signs warning of the presence of chemical carcinogens should be posted at all entrances to regulated work areas. Labels should be used on all carcinogen containers to identify the chemical and to warn of the carcinogenic hazard.

(5) Good hygiene should be maintained through work practices, such as use of protective clothing; availability of showers and change rooms; bans on eating, drinking, and smoking in regulated areas; and use of nonpermeable work surfaces.

(6) Procedures should be established for emergency actions involving chemical carcinogens (e.g., cleanup of spills or accidental releases). Occurrences that could result in exposure of personnel or release to the environment should be investigated and, if appropriate, reported.

1.10 Use of appropriate industrial hygiene standards.

A list of the DOE-prescribed worker protection standards is located in DOE Order 440.1. Other references are contained in the *DOE Department-Wide Functional Area Qualification Standard: Industrial Hygiene Qualification Standard*. Other references and consensus standards should be evaluated by the senior industrial hygienist for incorporation into the worker protection program. Examples include: the ACGIH's Ventilation Manual; the AIHA's *Strategy for Occupational Exposure Assessments*; American National Standards Institute standards on eyewashes and safety showers; the American Society of Heating Refrigerating, and Air-Conditioning Engineers' *ASHRAE Handbook and Product Directory* volume on *Fundamentals*; the Illuminating Engineering Society's Illumination Handbook; etc.

1.11 Professionally and technically qualified industrial hygienists to manage and implement the industrial hygiene functions of the worker protection program.

1.11.1 The qualifications for industrial hygiene staff are described in the *U.S. Department of Energy Department-Wide Functional Area Qualification Standard: Industrial Hygiene Qualification Standard*.

1.11.2 The industrial hygiene aspects of the worker protection program should be directed by a senior industrial hygienist with appropriate experience who should report directly to a senior member of management. A senior industrial hygienist is a person who is certified in the practice of industrial hygiene or who meets the American Board of Industrial Hygiene's (ABIH's) requirements for eligibility to take the examinations for certification. At a minimum, such individuals must have a college or university degree in industrial hygiene; chemistry; physics; chemical, mechanical, or sanitary engineering; medicine; or biology, special studies and training, and 5 years of full-time employment in the professional practice of industrial hygiene. (See the ABIH Bulletin for detailed requirements for certification or eligibility for certification.)

1.11.3 Management should ensure that its industrial hygiene staff:

(1) Is adequately trained in the anticipation, recognition, evaluation, and control of hazardous and potentially hazardous occupational exposures; and

(2) Has the support necessary to maintain and enhance the staff's proficiency in industrial hygiene through continued training, professional education, and professional activities that can include certification.

2. UNIFYING CONCEPTS

The following paragraphs, which give implementing guidance for requirements contained in other DOE Orders, are provided here so these Industrial Hygiene Management Practices contain all the essential industrial hygiene functions of the worker protection program.

2.1 Management should annually perform and document self-assessments to ensure the effectiveness of industrial hygiene functions.

In addition, self-assessments should include reviews of the following:

2.1.1 Adequacy and utilization of industrial hygiene resources;

2.1.2 All exposure assessment records, results of health hazard assessments, illness and injury logs and supporting information, and any other records relevant to the maintenance of ~~the~~ industrial hygiene functions;

2.1.3 Compliance with applicable DOE-prescribed industrial hygiene requirements;

2.1.4 The program for receiving and responding to employee occupational health concerns and the performance in responding to these concerns;

2.1.5 Health hazard assessment and control records to assess progress in abating health hazards;

2.1.6 All written programs required by DOE-prescribed industrial hygiene requirements (e.g., the contractor's hazard communication program and respiratory protection program); and

2.1.7 The training program and its effectiveness.

2.2 Management should correct any occupational health deficiencies identified by the program self-assessment.

2.3 In order to support health surveillance activities, management should maintain the records specified below in a manner that permits ready retrieval of information in the records and supporting documentation:

2.3.1 Drawings and/or written descriptions, as outlined in the health hazard assessment and control records section;

2.3.2 Inventories of hazards;

2.3.3 Exposure assessment data as outlined in the health hazard assessment and control records section; and

2.3.4 Industrial hygiene survey reports, including all records of corrective actions outlined in the health hazard prevention and control records section.

Section IV. ADDITIONAL INFORMATION

These Industrial Hygiene Management Practices for Worker Protection Programs were developed by the DOE Industrial Hygiene Coordinating Committee for use by the entire DOE community.